

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

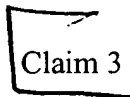
Claim1 (Canceled)

Claim 2 (Previously Presented): A facing-targets sputtering apparatus for producing a film on a substrate comprising:

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- a box unit having a discharge space provided therein and having at least three openings formed in corresponding three side faces thereof including two facing side faces;
 - a pair of target units disposed so as to cover the corresponding two facing openings, each unit having a target on the discharge space side;
 - a substrate holder for holding a substrate in such a manner so as to cause the substrate to face the opening remained open and be perpendicular to the pair of target units; and
 - a power supply unit for supplying direct-current power and high-frequency power to the paired targets, wherein said paired target units each comprises:

- a cooling block for holding the corresponding target on a surface thereof;
 - magnetic field generation means for generating a magnetic field in such a manner as to surround the discharge space; and
 - electron reflection means for reflecting an electron to the discharge space
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disposed on the magnetic field generation means in such a manner as to surround the corresponding target.

 Claim 3 (Canceled)

Claim 4 (Currently Presented): A facing-targets sputtering method for producing a film on a substrate which comprises:

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Cont'd (a) generating a magnetic field extending between two targets from one target to the other, the targets being disposed a predetermined distance away from each other, in such a manner as to surround a discharge space provided between the two targets, to thereby confine plasma within the discharge space by means of the magnetic field; and

(b) performing sputtering under vacuum to form a film on a substrate disposed at a position beside the discharge space, wherein

electrons are caused to be reflected into the discharge space by use of electron reflection means disposed around the corresponding targets, and

power generated through superposition of high frequency power to direct current power is applied to the targets to effect the sputtering;

wherein the side faces of the discharge are closed except for a side face which faces the substrate.

Claim 5 (Previously Presented): A facing-targets sputtering method according to claim 4, wherein in addition to the magnetic field extending between the targets from one target to the other, a circular arc magnetic field is generated at a peripheral edge portion of each target.

Claim 6 (Canceled): A facing-targets sputtering method according to claim 4, wherein the side faces of the discharge space is closed except for a side face which faces the substrate.

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contd Claim 7 (Previously Presented): A facing-targets sputtering method according to claim ⁴~~6~~, wherein a side face opposite to the side face facing the substrate is closed by a target unit. ₂

Claim 8 (Previously Presented): A facing-targets sputtering method according to claim 4, wherein the electron reflection means and the targets are made of the same material.

Claim 9 (Previously Presented): A facing-targets sputtering method according to Claim 4, wherein the targets are of Cu, a Cu alloy, Al, or an Al alloy.

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Claim ~~10~~ (Previously Presented): A facing-targets sputtering method according to claim 4, wherein a film is formed at a gas pressure of 0.5 Pa or lower.

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Claim ~~11~~ (Previously Presented): A facing-targets sputtering method according to claim 9, wherein the film is a conducting film.

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~~11~~, Claim 12 (Previously Presented): A facing-targets sputtering method according to claim ~~11~~, wherein the film is formed at a gas pressure of 0.05 Pa or lower.

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Claim ~~13~~ (Previously Presented): A facing-targets sputtering method according to claim ~~11~~, wherein the film is a metal film.

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Claim ~~14~~ (Previously Presented): A facing-targets sputtering method according to claim 4, wherein a sputtering unit comprising the facing targets is a box sputtering unit configured to close side faces of the discharge space except for a side face facing the substrate; and the film is formed at a gas pressure of 0.01 Pa or lower.

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Claim ~~15~~ (Previously Presented): A facing-targets sputtering method according to claim ~~14~~, wherein a side face opposite to the side face facing the substrate is closed by a target unit.

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~~14~~, Claim 16 (Previously Presented): A facing-targets sputtering method according to claim ~~14~~, wherein the film is a metal film.

Claim 17 (Previously Presented): A facing-targets sputtering method according to claim 16, wherein the film is a wiring film of a semiconductor device.

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c ¹⁴ Claim ~~18~~ (Previously Presented): A facing-targets sputtering method according to Claim ~~18~~, wherein the film ^{is} ~~are~~ of Cu, a Cu alloy, Al, or an Al alloy.

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^{Cont'd} ³ Claim 19 (canceled)

Claim ~~20~~ (New): A facing-targets sputtering apparatus according to claim 2, wherein the discharge space is evacuated at a gas pressure of 0.5 Pa or lower when a film is formed.

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Claim ~~21~~ (New): A facing-targets sputtering method for producing a film on a substrate which comprises:

(a) generating a magnetic field extending between two targets from one target to the other, the targets being disposed a predetermined distance away from each other, in such a manner as to surround a discharge space provided between the two targets, to thereby confine plasma within the discharge space by means of the magnetic field; and

(b) performing sputtering under vacuum to form a film on a substrate disposed at a position beside the discharge space, wherein

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electrons are caused to be reflected into the discharge space by use of electron reflection means disposed around the corresponding targets, and

power generated through superposition of high frequency power to direct current power is applied to the targets to effect the sputtering;

wherein a film is formed at a gas pressure of 0.5 Pa or lower.
